Commonwealth of Kentucky
Division for Air Quality

PROPOSED PERMIT STATEMENT OF BASIS

TITLE V/PSD/SYNTHETIC MINOR NO. V-05-088 R1
ALCAN PRIMARY PRODUCTS CORPORATION
HENDERSON, KY
SEPTEMBER 12, 2007
HOSSEIN RAKHSHAN, REVIEWER
SOURCE ID#: 021-101-00029
SOURCE AI#: 1788
ACTION: APE20070002

.

Change(s) to Permit (Revision 1):

A. PROJECT DESCRIPTION:

Through a PSD permit application submitted on August 13, 2007, Alcan is seeking a modification to its existing Title V permit, in accordance with 401 KAR 52:020, authorizing the refurbishment of the existing 261 Anode Bake Furnace at the facility, designated in the current Title V permit under the Unit ID N2 (EE). The facility is a major source under the Prevention of Significant Deterioration (PSD) permitting program. For PM/PM_{10}, a synthetic minor limit is being established that will maintain emission increases to less than the PSD significant emission rate threshold. This permit action includes PSD permitting elements for SO_2 and CO.

The refurbishment of the bake furnace will increase the maximum potential baked anode production capacity to 145,730 tpy, an approximately 25% increase compared to current levels. Once this process is completed, the bake furnace will have 72 total sections available for production. The potential emissions of SO_2 and CO from the bake furnace following the completion of the project minus current actual baseline emissions will exceed the PSD Significant Emission Rate thresholds. Emission increases calculated on the same basis for all other pollutants except for PM_{10} fall well below their respective PSD Significant Emission Rate thresholds**.**

Various refurbishment activities will be completed as part of the project. Major items include the replacement and rebuilding of the refractory linings of the furnace sections, an extension of the automated firing system to the 261W portion of the furnace, installation of new ductwork and air moving equipment to direct the exhaust stream from the 261W portion of the bake furnace to the existing alumina dry scrubber system, and the installation of new material handling equipment inside the furnace building (e.g., to load and unload anodes). No changes to the existing alumina dry scrubber and fabric filter system, termed the A-446, will be necessary as part of the project, as it currently has excess capacity.

Although the refurbished 261 Furnace will be able to produce more baked anodes following completion of the project (due to the recommissioning of a portion of 261W), overall aluminum production at the facility is currently constrained by the capacity of the three existing potlines.

Currently, the potlines operate at or near capacity year round. However, operation of the 261 Furnace at its maximum capacity has been accounted for in this permit action since increased production in the furnace could be achieved from processing green anodes for other plants.

This permit is being issued as a permit modification. The Division incorporated the following changes to the permit;

1) In Section B:

a) The permittee shall install and operate an advanced furnace firing and control system to minimize natural gas usage per unit of baked anode production and thus, CO emissions (401 KAR 51:017; BACT Work Practice).

b) To preclude the requirements of 401 KAR 51:017, the permittee shall not allow PM/PM_{10} emissions from the Anode Bake Furnace to exceed 5.14 lb/hr on a 3-hour average basis (Synthetic Minor Limit).

c) A sample of green anode and baked anode shall be tested monthly for sulfur content. A sample of packing coke shall be tested quarterly for sulfur content.

d) The permittee shall perform a performance test annually within 3 months of the anniversary of the permit using EPA Reference Method 10 to quantify CO emissions from each operating reactor stack of the dry scrubber/baghouse system. The anniversary of the permit is the day of the month when permit V-05-088 was issued.

e) The permittee shall perform a performance test within one year of completing Phase 1 of the refurbishment project authorized through Permit V-05-088 Revision 1 (i.e., the refurbishment of 18 sections of 261W) to quantify PM/PM_{10} emissions from each operating reactor stack of the dry scrubber/baghouse system and to show compliance with the emission limit of 5.14 lb/hr. Subsequent performance testing for PM/PM_{10} shall be completed once per permit term. EPA Reference Method 5 shall be used during the initial demonstration of compliance and subsequent tests to quantify PM/PM_{10} emissions from each operating reactor stack of the dry scrubber/baghouse system.

f) The permittee shall maintain records of the sulfur content measurements of green anodes, baked anodes, and packing coke used in quantifying SO_2 emissions using the Alcan SO_2 Calculation Engine.

g) The permittee shall not allow SO_2 emissions from the Anode Bake Furnace to exceed 521 total tons in any 12-month consecutive period (BACT Limit).

B. EMISSIONS ANALYSIS:

The 261 Furnace is a source of SO_2, CO, PM, fluorides, sulfuric acid mist (H_2SO_4), polycyclic organic matter (POM), and other combustion by-products (including NO_X and VOC). Due to this modification, SO_2 and CO will be emitted in excess of the PSD significant emission rate.

Summary of Emissions for the Proposed Project

Pollutant	Baseline Emissions (tpy)	Basis	Future Potential Emissions (tpy)	Basis	Project Emissions Increase (tpy)	PSD Significant Emission Rate (tpy)
SO_2	333	Alcan SO_2 Engine	521	Portion of BACT Limit Proposed	188	40
CO	345	Stack Test Factor	651	Stack Test Factor + Margin	305	100
PM_{10}	7.6	Stack Test Factor	22.5	Stack Test Factor + Margin	14.9	15
NO_X	9.4	AP-42 for NG Combustion	10.7	AP-42 for NG Combustion	1.3	40
VOC	1.04	AP-42 for NG Combustion	1.18	AP-42 for NG Combustion	0.15	40
Fluorides	NA		0.54	Stack Test Factor + Margin	<< 3	3
H_2SO_4	5.6	Stack Test Factor	7.8	Stack Test Factor + Margin	2.2	7

$PM_{2.5}$ emissions can be conservatively assumed to equal PM_{10} emissions.

Since total fluoride emissions are estimated to be 0.5 tpy, emission increases of fluorides other than HF are implicitly < 3 tpy.

C. PSD REVIEW

1. PSD Applicability:

The Alcan facility is located in Henderson County, which has been designated by U.S. EPA as unclassified/attainment for all criteria pollutants.[1] Therefore, with respect to the federal New Source Review permitting program, only Prevention of Significant Deterioration (PSD) requirements could potentially apply to the proposed project. Classified under SIC 3334 (Primary Production of Aluminum), the facility is on the list of 28 specifically defined industrial source categories for which the "major" source threshold is 100 tpy of any regulated pollutant.[2] [3] Since the potential emissions of at least one regulated air pollutant (e.g., SO_2) currently exceeds 100 tpy, the facility is classified as an existing major source under the PSD program.

As an existing major source under the PSD program, the emissions increases from the project under consideration were evaluated to assess PSD applicability. The emissions increases of SO_2 and CO were determined to be greater than their respective PSD Significant Emission Rates. Potential emissions increases of all other NSR regulated pollutants, with the exception of PM_{10}, are well below their corresponding PSD Significant Emission Rates. Therefore, this permit action does not trigger PSD permitting requirements for these pollutants and no new emission limits are proposed or anticipated. With regard to PM_{10}, the Division has established a synthetic limit on emissions of 5.14 lb/hr and project increases are limited to less than the PSD triggering level.

---

1 401 KAR 51:017 Section 2.

2 40 CFR § 51.166(a)(1).

3 401 KAR 51:001, Section 1 (120)(a)(1)(b)

Since the project will result in a significant net emissions increase of sulfur dioxide (SO_2) and carbon monoxide (CO), as determined in accordance with Kentucky's PSD regulations (401 KAR 51:017), the six required elements of a PSD permit application listed below were addressed in the application for these pollutants.

(1) Demonstration of the application of Best Available Control Technology (BACT).
(2) Demonstration of compliance with each applicable emission limitation under Title 401 KAR Chapters 50 to 63 and each applicable emission standard and standard of performance under 40 CFR 60 and 61.
(3) Air quality impact analysis
(4) Class I area(s) impact analysis
(5) Projected growth analysis.
(6) Analysis of the effects on soils, vegetation, and visibility.

2. PSD Modifications:

The proposed permit will authorize the refurbishment of the existing 261 Furnace to include 72 operable sections increasing the potential bake anode production capacity of the furnace to 145,730 tpy. Alcan will utilize the management of raw materials and process variables as BACT for SO_2 with a BACT emission limit of 521 tpy (12-month rolling total) on the anode bake furnace. Alcan will utilize an Advanced Firing and Control System as BACT for CO to minimize emission from the anode bake furnace.

3. BACT Analysis:

BACT for SO_2:

In accordance with the top-down BACT evaluation conducted by the applicant, the Division agrees that the management of raw materials and process variables constitutes BACT. Alcan presented a review of raw material sulfur content properties and production yield values that result in an SO_2 emission rate of 521 tpy for the Anode Bake Furnace. Although Alcan proposed that the existing cap on SO_2 emissions for the potlines and bake furnace combined satisfies BACT, the Division has established an individual BACT emission limit for SO_2 on the bake furnace. Specifically, Alcan will utilize the management of raw materials and process variables as BACT for SO_2 with a BACT emission limit of 521 tpy (12-month rolling total) on the anode bake furnace.

Rather than establishing an explicit limit on the sulfur content of petroleum coke or a short-term emission limit for the anode bake furnace alone, the SO_2 BACT emission limit was established on a 12-month rolling basis for the following reasons:

(1) The supply of anode quality petroleum coke in the marketplace is decreasing and the sulfur content of petroleum coke and pitch are increasing. As supported by market studies conducted internally by Alcan, Alcoa, and by two prominent industry analysts and summarized in the

application, it is clear that anode raw material supplies in the U.S. are constrained and that sulfur contents have and will continue to increase in the future. These facts must be taken into consideration in establishing the SO_2 BACT limit. Essentially, even though some aluminum facilities have accepted sulfur content limits of 3% or lower, it is no longer feasible to ensure a consistent supply of raw material at this target and therefore to enforce a sulfur content limit at this level. It also not feasible for primary aluminum plants to function under "per shipment" limits on petroleum coke sulfur content since supplies meeting a given sulfur content target will not always be available. Instead of meeting limitations on the specifications for a particular raw material, the Division acknowledges the need for flexibility in managing all process variables to meet emission limits and therefore has set the BACT emission limit accordingly.

(2) The annual SO_2 emission limit on the anode bake furnace represents a stringent constraint on SO_2 emissions and corresponds to the application of BACT. With the sulfur content of petroleum coke trending up, Alcan will be required to actively manage the sulfur content of raw materials and other process variables that control SO_2 emissions in order to ensure the BACT emission limit of 521 tpy is met.

(3) Use of a mass-balance approach to quantify SO_2 emissions from the bake furnace justifies use of an annual period for the emission limit. The specific averaging period under which a BACT emission limit must be established is neither explicitly defined within the definitions of BACT under 401 KAR 51:001 nor in the PSD regulations under 401 KAR 51:017, and therefore, the Division has the discretion to establish the form of the BACT limit on a case-by case basis. Even though the anode bake furnace in aggregate operates continuously, the baking of anodes in any given section of the furnace is a batch process with an extremely long operating cycle (18-20 days). Setting a shorter-term emission limit on a process with a 20-day batch cycle would be impractical. Even on a monthly basis, there is variability in SO_2 emissions from the bake furnace and potlines due to variations in the sulfur content and other quality specifications for the raw materials and variations in the process parameters that are critical (i.e., ratio of green to baked anode weight for the bake furnace and consumption of baked anodes per mass of aluminum produced at the potlines). Setting long-term average emission limits is common in situations when the best compliance demonstration method is the utilization of a mass balance. The Division agrees with Alcan that an emission limit established on a 12-month rolling total basis is appropriate in this circumstance.

BACT for CO:

Alcan is installing a state-of-the art firing system for the anode bake furnace that minimizes energy usage and thus, CO emissions (from improved exhaust gas combustion efficiency and reduced natural gas consumption).

D. AIR QUALITY IMPACT ANALYSIS:

Pursuant to Regulation 401 KAR 51:017, Section 11, an application for a PSD permit shall contain an analysis of ambient air quality impacts. As indicated in Section D1 above, the proposed

modification will result in a net emissions increase in excess of the significant emission rates for SO_2 and CO. Therefore, a PSD air quality analysis for these pollutants was included in the permit application.

The air dispersion modeling analyses described in the application were conducted in accordance with 40 CFR Part 51, Appendix W, which contains the federal *Revision to Guideline on Air Quality Models* (*Guideline*). The application for the proposed modifications contained Class II area air dispersion modeling analyses for criteria pollutants (SO_2 and CO) to determine the maximum ambient concentrations attributable to emissions from the facility and other nearby regional sources for each of these pollutants for comparison with:

(1) The significant impact levels (SIL) found in 40 CFR 51.165(b)(2);
(2) The monitoring de minimis concentrations found in 401 KAR 51:017, Section 7(5);
(3) The PSD Increments found in 401 KAR 51:107, Section 2;
(4) The National Ambient Air Quality Standards (NAAQS) found in 401 KAR 53:010.

The Class II area modeling analyses were completed in three principle steps: the Significance Analysis (comparison of modeled impacts against the SILs and monitoring *de minimis* concentrations), the NAAQS Analysis, and the PSD Increment Analysis.

1. Modeling Methodology:

Model Selection:

Taking factors specified in the *Guideline* under consideration, the AERMOD modeling system was used to represent all point sources at the Alcan facility and in the regional inventory. AERMOD is the default model for evaluating impacts attributable to industrial facilities in the near field (i.e., source receptor distances of less than 50 km), and is the recommended model in the *Guideline*. The unique dispersion characteristics of the potline roof vents (modeled in the NAAQS and PSD Increment Analyses) at the Alcan facility required the use of the Buoyant Line and Point Source (BLP) Dispersion Model be used to model these emission sources.

2. Significance Analysis:

The Significance Analysis was conducted to determine whether the net emissions changes associated with the 261 Furnace refurbishment project (188.4 tpy for SO_2 and 305.5 tpy for CO) exceeded the Significant Impact Levels (SILs) listed in Table below.

Significant Impact Levels, NAAQS, PSD Class I and II Increments, and *De Minimis* Concentrations for SO_2 and CO:

Pollutant	Averaging Period	PSD SIL ($\mu g/m^3$)	1st High Impact Modeled in Significance Analysis ($\mu g/m^3$)	Primary and Secondary NAAQS ($\mu g/m^3$)	Class I PSD Increment ($\mu g/m^3$	Class II PSD Increment ($\mu g/m^3$)	Monitoring *De Minimis* Concentration ($\mu g/m^3$)
SO_2	3-hour	25	94.1	1,300 (0.5 ppm)*	25	512	--
	24-hour	5	18.1	365 (0.14 ppm)*	5	91	13
	Annual	1	1.5	80 (0.03 ppm)**	2	20	--
CO	1-hour	2,000	240.6	40,000 (35 ppm)*	--	--	--
	8-hour	500	77.5	10,000 (9 ppm)*	--	--	575

* Not to be exceeded more than once per year.
** Annual arithmetic average.

The significance analysis for SO_2 showed that the proposed project causes impacts above the SO_2 SILs for all averaging periods. The SIA was determined to be 4.0 km. Therefore, both a NAAQS and PSD Increment analysis were conducted for SO_2.

The significance analysis for CO showed that no off-site impacts of CO caused by the refurbishment project exceed either the 1-hour or 8-hour SILs. Thus, the proposed project has an insignificant impact on the ambient CO concentrations in the area surrounding the Alcan and no further analysis was required.

In addition to determining whether the applicant can forego further modeling analyses, the PSD significance analysis is also used to determine whether the applicant is exempt from ambient monitoring requirements. To determine whether pre-construction monitoring should be considered, the maximum impacts attributable to the emissions increases from a project were assessed against monitoring *de minimis* levels. These levels for the applicable averaging periods for SO_2 and CO are provided in 401 KAR 51:017 Section 7 (5)(a) and are listed in Table above.

Modeled impacts in the significance analysis for SO_2 exceeded the 24-hour *de minimis* concentration. However, with five PSD qualified SO_2 monitoring stations within 40 km of the Alcan facility and an SO_2 monitoring network operated by WKE in the immediate vicinity of the Alcan, the Division has concurred that there is sufficient SO_2 ambient air quality data that is representative of the air quality in the area surrounding the Alcan facility without conducting any ambient monitoring. The modeled impacts for the CO Significance Analysis were less than the 8-hour *de minimis* concentration, and therefore, no pre-construction monitoring for CO is required for this project.

3. NAAQS Analysis:

The SO_2 NAAQS analysis included potential emissions from sources at the Alcan facility and from sources included in the regional inventory. Considering both the proximity and the downwind

direction of the potential SO_2 monitoring locations in the area surrounding the Alcan facility that could be used to define a background concentration for this project, the West Mill Road Fire Station site in Evansville, Indiana was chosen as the most representative SO_2 monitoring station for establishing a SO_2 background concentration. The modeled impacts, added to appropriate background concentrations, were assessed against the applicable NAAQS to demonstrate compliance. To demonstrate compliance with the annual SO_2 standard, the maximum-modeled annual arithmetic mean of the five meteorological data years modeled was compared to the NAAQS. For compliance with the short-term SO_2 standards (3-hour and 24-hour for SO_2), the highest second-high modeled concentration over all five years of meteorological data was compared to the NAAQS.
As shown in table below, the NAAQS analysis results demonstrated that the maximum SO_2 impacts are less than the NAAQS for all averaging periods:

Results of NAAQS Analysis:

Averaging Period	Year of Maximum Impact	Maximum Impact from AERMOD ($\mu g/m^3$)	Maximum Impact from BLP** ($\mu g/m^3$)	Background Concentration† ($\mu g/m^3$)	Combined Maximum Impact ($\mu g/m^3$)	NAAQS ($\mu g/m3$)
3-hour*	1995	580.21	1.8	153.5	**735.51**	**1,300**
24-hour*	1995	286.20	2.4	43.9	**332.50**	**365**
Annual	1995	52.38	0.2	10.5	**63.08**	**80**

* Evaluated 2nd high impacts for each year modeled since NAAQS standards are not to be exceeded more than once per year.

** A square receptor grid containing 100 receptors spaced at 100 meters centered on the location of the maximum impact from AERMOD was modeled in BLP. Meterological data for the maximum event from AERMOD was used (i.e. 3-hr meterological event corresponding to highest impact in AERMOD).

† Based on SO_2 ambient monitoring data from the West Mill Rd. Fire Station site in Evansville, Indiana for the three year period from 2004 to 2006.

4. PSD Increment Analysis:

The sum of the PSD increment concentration and a baseline concentration defines a "reduced" ambient standard, either lower than or equal to the NAAQS that must be met in a designated attainment area. Significant deterioration occurs if the change in emissions occurring since a baseline date results in an off-property impact greater than the PSD Increment (i.e., the increased emissions "consume" more than the available PSD Increment). The determination of whether an emissions change at a given source consumes or expands increment is based on the source definition and the time the change occurs in relation to baseline dates. The major source baseline date for SO_2 is January 6, 1975. Actual emissions changes at major sources due to a physical change or a change in the method of operation (i.e., modification or construction) that occur after the major source baseline date affect increment, but not until the minor source baseline date, which is set at the point the first complete PSD permit application is submitted in a given area usually arranged on a county by county basis. After the minor source baseline date, actual emission changes at any source, major or minor, affect increment.

To demonstrate compliance with the Class II increments, "increment-affecting emissions" from the

Alcan facility and other regional inventory sources were modeled and assessed cumulatively against the PSD Increments. With the exception of WKE, Alcan conservatively treated emissions from all regional sources, as reported in annual emission inventory statements, as Increment consuming emissions, without regard to when minor source baseline dates were set and without consideration of possible emission decreases that may have occurred since those dates that would have expanded the available Increment. For WKE, there have been substantial reductions in SO_2 that have occurred since the major source baseline date due to the installation of flue-gas desulfurization systems. Conservatively, WKE was excluded from the analysis and these Increment expanding emissions were not accounted for. The Division agrees that the streamlined methodology used by Alcan to define emissions from regional sources in the Increment modeling analysis was both conservative and acceptable.

The results from the SO_2 PSD Increment analysis are shown in Table below. Impacts calculated are below the SO_2 PSD Increments for all averaging periods. The Division concurs that the modeling results presented demonstrate that the Alcan facility, in conjunction with all other increment-affecting sources in the surrounding area, will not consume more than the available PSD Increment.

Results of PSD Increment Analysis

Averaging Period	Year of Maximum Impact	Maximum Impact from AERMOD ($\mu g/m^3$)	Maximum Impact from BLP** ($\mu g/m^3$)	Combined Maximum Impact ($\mu g/m^3$)	Class II PSD Increment ($\mu g/m3$)
3-hour*	1995	201.19	18.2	**219.39**	**512**
24-hour*	1995	83.17	0.7	**83.87**	**91**
Annual	1995	13.86	0.1	**13.96**	**20**

* Evaluated 2nd high impacts for each year modeled since NAAQS standards are not to be exceeded more than once per year.

** A square receptor grid containing 100 receptors spaced at 100 meters centered on the location of the maximum impact from AERMOD was modeled in BLP. Meterological data for the maximum event from AERMOD was used (i.e. 3-hr meterological event corresponding to highest impact in AERMOD).

5. Class I Area Impacts:

Pursuant to 401 KAR 51:0017 Section 14, air quality modeling analyses of impacts on federally protected Class I areas are a potential component of PSD review, and, if required, are performed to demonstrate compliance with PSD Class I Increment standards and air quality related values (AQRV) thresholds for regional haze and deposition. The Alcan facility is within 300 km of the following federally protected Class I areas:

(1) Mammoth Cave National Park, located approximately 118 km southeast of the facility, and
(2) Mingo Wilderness Area located approximately 244 km west of the facility.

In consideration of the distance and the relative location of the Alcan facility to the closest Class I area, Mammoth Cave, and the relatively small level of emissions increases of pollutants relevant to

the Class I Increment and AQRV analysis (SO_2, SO_4, PM_{10}, and NO_X) associated with the 261 Furnace refurbishment project, it is unlikely the project would contribute to any quantifiable or adverse impacts in any Class I area. After reviewing information provided on the project, Mr. Bob Carson of the National Park Service, the Federal Land Manager for Mammoth Cave, confirmed in correspondence with Alcan that no analysis of the impacts of the project on the AQRV at any Class I area was required for this project. Accordingly, the Division concurred that Alcan was not required to complete Class I area analyses, either for Class I Increment or AQRVs.

6. **Additional Impacts Analysis:**

401 KAR 51:017 Section 13 requires that three additional impact analyses be performed as part of a PSD permit action. These evaluations include a growth analysis, a soil and vegetation analysis, and a visibility analysis. With regard to growth, no increase in employment or population of the surrounding area or any other growth of an amount that could result in a quantifiable impact on air quality is expected to occur as a result of the proposed anode bake furnace project. With regard to soils and vegetation, the U.S. EPA developed the secondary NAAQS to protect certain air quality-related values (i.e., soil and vegetation) that were not sufficiently protected by the primary NAAQS. The secondary NAAQS represent levels that provide protection for public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. As shown in the NAAQS analysis table above, SO_2 has a secondary standard of 1300 $\mu g/m^3$ for a 3-hour averaging period. Since ambient concentrations were demonstrated to be less than the secondary NAAQS, the Division concurs that emissions from that project will not result in harmful effects to either soil or vegetation. With regard to visibility, all sources at Alcan maintain compliance with applicable opacity restrictions, and therefore, visibility impairment at any off-site location is not expected. While quantitative analyses of plume visibility at sensitive off-site locations can be conducted using the U.S. EPA's approved screening model, VISCREEN, the emissions increases of visibility affecting pollutants (PM, NO_X, and Primary Sulfates) from this project were relatively small (less than 20 tpy), and therefore, modeled visibility impacts above the screening thresholds are not expected. Accordingly, the Division did not require a quantitative Class II area visibility analysis for this project.

PUBLIC AND U.S. EPA REVIEW:

Public notice was placed in the Henderson Gleaner on December 04, 2007. The comment period ended on January 04, 2008. There were only two comments received from Alcan on December 19, 2007 via E-mail. The Division's response to comments is discussed below. Minor changes were made to the permit as a result of the comments received, however, in no case were any emissions standards, or any monitoring, recordkeeping or reporting requirements relaxed. Please see Response to Comments for a detailed explanation of the changes made to the permit. The U.S. EPA has 45 days to comment on this proposed permit.

Response to Comments:

Company Comment #1:
The address under the general information section of the Permit Application Summary Form should read as follows:

9404 State Route 2096
Robards, KY 42452-9735

Response:
The Division has corrected the address.

Company Comment #2 – CO Testing Requirement:
As written, Condition 3.g. in Section B for the Anode Bake Furnace requiring annual CO emissions testing does not clearly state that the testing should be performed only after Phase 1 of the refurbishment has been completed. Therefore, Alcan is requesting that the language for this condition be changed as follows:

Following the completion of Phase 1 of the refurbishment project authorized through Permit V-05-088 Revision 1, the permittee shall perform a performance test annually within 3 months of the anniversary of the permit using EPA Reference Method 10 to quantify CO emissions from each operating reactor stack of the dry scrubber/baghouse system. (The anniversary of the permit is the day of the month when permit V-05-088 was issued.)

Response:

The Division has revised the permit as requested and has changed the language for this condition as follow:
Following the completion of the refurbishment project authorized through Permit V-05-088 Revision 1, the permittee shall perform a performance test annually within 3 months of the anniversary of the permit using EPA Reference Method 10 to quantify CO emissions from each operating reactor stack of the dry scrubber/baghouse system. (The anniversary of the permit is the day of the month when permit V-05-088 was issued.)

SOURCE DESCRIPTION:

Alcan Primary Products Corporation (Alcan) owns and operates a primary aluminum production facility near Robards, Kentucky (Sebree Works) and has the capability to produce 299,982 tons per year of aluminum ingot. The facility is a major source under the Title V operating permit program and currently operates in accordance with Title V operating permit V-05-088, issued on April 3, 2007.

At the Sebree Works, Alcan produces primary aluminum from raw alumina (Al_2O_3) by applying electric current to the alumina in vessels termed reduction cells or pots. Alcan operates three nearly identical potlines. Each potline is composed of two potrooms that each contains 64 reductions cells

for a total of 128 cells per potline. The pots are constructed to form an electrolytic cell with an anode, cathode, and electrolyte. As the electric current is applied, an electrolytic reaction occurs reducing the alumina into its constituent species aluminum (Al) and oxygen (O_2).
The exterior of the pots consists of rectangular steel lined with refractory thermal insulation. Within the pot is an inner lining of carbon (the cathode) that contains the molten electrolyte (cryolite), the main constituents of which are sodium fluoride and aluminum fluoride. Carbon anode blocks are placed just below the surface of the electrolyte to complete the reaction circuit and to allow the current applied to metals rods (solid copper) attached to the anode blocks to pass through the molten bath (molten aluminum, cryolite, and alumina) and the carbon cathode lining and the finally to current collector bars where the remaining current is recycled to the process. The molten aluminum formed in the reduction cells (as it is liberated from alumina with oxygen) settles to the bottom of the pots where it accumulates. The oxygen liberated reacts with the carbon anode blocks forming carbon dioxide. The accumulated molten aluminum produced by the reduction cells from all three potlines is sent to the casthouse to be formed into billets, ingots, and T-bars. The casthouse utilizes natural gas-fired holding furnaces and homogenizing furnaces to alloy and heat treat final casting products. To provide baked carbon anodes to the reduction cells, Alcan operates an anode paste mixing and forming operation and an anode bake furnace, in which the "green anodes" are calcined. The green anodes are formed from petroleum coke, recycled spent anode material, and coal tar pitch. The formed anodes are compressed and placed within the 261 Anode Bake Furnace, where they are baked to remove volatiles, leaving a solid carbon block.

INITIAL TITLE V PERMIT:

BACKGROUND: On November 20, 2003, the Division issued a preliminary determination on the initial Title V permit for the primary aluminum production facility owned and operated by Alcan Primary Products Corporation in Henderson, Kentucky. However, we are re-public noticing the Title V permit of Alcan (AI#1788) since the previous proposed permit did not address company's comments. This permit also includes additional Electric Induction Furnace. The facility took Synthetic Minor Limits to avoid PSD review. The limits of actual emission of Sulfur Dioxide from three potlines and Anode Bake Furnaces are limited to not more than 5262.3 tons per year, a limitation of no more than two Electric Induction Furnaces can be operated at the same time, and process rate for electric induction furnaces not to exceed total annual process rate of 9,360 tons of cast iron production based on 12 consecutive months. This will assure that emission increase of SO_2 is less than 40 TPY.

In conclusion, this Title V issuance is considered to be initial.

COMMENTS: Emission factors are from AP-42, material balances, stack tests, and MSDS.

OPERATIONAL FLEXIBILITY: Only as allowed by the Primary and Secondary Aluminum MACTs

PERIODIC MONITORING:

A. SUBJECT ITEM 1 REQUIREMENTS: Existing Process Sources

1. <u>Description:</u>

7. Unit #	*8.* Unit Name	*9.* Material	Rate (tons /year)	*10.* Construction Date
A1 (T1-T3)	Barge Unloading	Raw Material	585,562 total	August 4, 1972
B4 (S7, S8)	Reacted Alumina Storage (2)	Reacted Alumina	140,160 each	August 4, 1972
G8 (I9)	Ingot Casting Dross Loading	Dross	5,820	August 4, 1972
M1(E9)	Anode Mix Hopper	Anode Raw Materials (No POM)	127,020	December 12, 1972
Q4 (EG)	Anode Rod Cleaning	Shot Blast Material	29,143	December 31, 1972
K1 (P1(23))	Bath Crushing/Crucible Cleaning	Anode Cover	54,137	1972
U1 (5P)	Bath Transfer to Storage Processing	Anode Cover	54,137	January 1, 1972
Q1 (EF)	Electric Arc Furnace (1)	Charge Materials	168 TPY Backup	December 31, 1972
A8 (T4)	Material Transfer	Alumina/Coke	585,562	August 4, 1972
A2 (S1, S2, S3)	Alumina Storage	Alumina	417,064 total	August 4, 1972
B6 (S4, S5)	Ore Storage	Unreacted Alumina	140,160 each	August 4, 1972
C1 (T5)	Material Transfer Rail Car	Alumina, Fluoride, Coke	193,970	August 4, 1972
C2 (T6, 2S)	Aluminum Fluoride	AlF3	3,800 Total	August 4, 1972
C4 (T7, T8, T9)	Coke Handling	Petroleum Coke	193,970 total	August 4, 1972
B6 (3S, 4S)	Coke Handling	Petroleum Coke	96,985 each	August 4, 1972
J1 (E1)	Butt Surge Tank	Anode Butts	70,000	August 4, 1972
K7 (E6)	Coke Crushing	Petroleum Coke	193,970	December 31, 1972
L1 (E7)	Coke Ball Mill	Petroleum Coke	193,970	December 31, 1972
L3 (E8)	Coke Fines Handling	Petroleum Coke	193,970	December 31, 1972
U2 (CI7)	Green Anode Dust Collector	Intermediate Coke	17,000	December 31, 1972
R2 (01) (AI)	Maintenance Area 046-Wood/Refractory Saw	Wood / Reforactory Brick	7	Dec 31, 1972
K5 (E5)	Butt Impactor	Anode Butts	70,000	December 31, 1972
J2 (E2)	Anode Butt Cleaning	Shot Blast	10,744	Aug 4, 1972

		Material		

*Emissions from all units controlled by baghouses.

2. Applicable Regulations:

401 KAR 61:020 Existing process operations.(before July 2, 1975)

3. Compliance Requirements:

a. To provide reasonable assurance that the particulate matter emission limitations are being met, the permittee shall perform annual Method 5 tests on K1 and U1. Annual testing must be completed within 12 months following issuance of this permit. For all other units, the permittee shall use the formula in the compliance demonstration to determine the particulate emissions based on the hourly process weight averaged over a month. The preventative maintenance plan shall be followed for all units.

b. To provide reasonable assurance that the particulate matter emission limitations (Subject Item 1 sources except for Kl and U1) are being met, the permittee shall monitor monthly the amounts and types of process weight added to each of these emission units and follow the facility preventative maintenance (PM) plan. Excursion from the requirements of the PM plan shall be corrected in a timely manner per 410 KAR 50:055 section 1, (4).

c. To provide reasonable assurance that the visible emission limitations are being met the permittee shall:

i. Determine the opacity of emissions during operation from each stack or vent by Reference Method 9 annually, or more frequently if requested by the Division.

ii. Perform a qualitative visual observation of the opacity of emissions from each stack/vent on a monthly basis and maintain a log of the observation. The log shall note:

- Whether any air emissions (except for water vapor) were visible from the vent/stack.
- All emission points from which visible emissions occurred.

iii. Determine the opacity of emissions by Reference Method 9 if qualitative visible emissions from any stack/vent are seen.

B. SUBJECT ITEM 2 REQUIREMENTS: New Process Sources

1. Description:

11. **Unit #**	***12.*** **Unit Name**	***13.*** **Material**	**Rate (tons /year)**	***14.*** **Construction Date**
Q2 (EF)	Electric Induction Furnaces (3) (see operating limitation)	Cast Iron	9,360	Dec 6, 1989 (No. 1 and No. 2), Jan 2006 (No. 3)
A6 (89)	Re-Melt Furnace	Aluminum	54,750	July 29, 1999
B5 (S9)	Reacted Alumina Storage	Alumina	140,160	August 4, 1979
U3 (EJ)	Central Anode Butts Cleaning	Anode Butts	80,000	December 31, 1990
B7 (S6)	Ore Storage	Unreacted Alumina	140,160	July 28, 1977
J3 (E3)	Butt Stripping/Crushing	Anode Butts	70,000	July 28, 1977
K3 (E4)	Butt Crushing	Anode Butts	70,000	June 19, 1979
E6 (EL)	Transloading Spent Potliner and Sandblasting Operations	Spent Potliner	180,136	October 1, 1995
R1 (EH)	Refractory/Carbon Saw	Carbon Blocks	16	June 19, 1979
E8 (EM)	Building (138) Vacuum System	Potliner Process Area	229	June 17, 1995
U4 (EQ1)	Anode Saw Dust Collector	Anode	120,888	2004
U5 (EO 72, 73)	Pitch Storage Tanks	Coal Tar	19,000	1977

* Emissions from all units controlled by baghouse(s).

2. **Applicable Regulations:**
401R 59:010 New process operations (on or after July 2, 1975)
40 CFR Part 63 Subpart RRR Secondary aluminum production NESHAP applies to the Re-Melt Furnace. The Re-Melt furnace is classified as a Group 2 furnace pursuant to Subpart RRR.

3. **Compliance Requirements:** To provide reasonable assurance that the visible emission limitations are being met the permittee shall:

   a. Determine the opacity of emissions during operation from each stack or vent by Reference Method 9 annually, or more frequently if requested by the Division.

   b. Perform a qualitative visual observation of the opacity of emissions from each stack/vent on a monthly basis and maintain a log of the observation. The log shall note:

      i. Whether any air emissions (except for water vapor) were visible from the vent/stack.
      ii. All emission points from which visible emissions occurred.

   c. Determine the opacity of emissions by Reference Method 9 if qualitative visible

emissions from any stack/vent are seen.

d. Do not operate more than two electric induction furnaces at one time. Do not exceed a total annual induction furnace process rate of 9,360 tons of cast iron production per year.

C. SUBJECT ITEM 3 REQUIREMENTS: Heat Exchangers

1. Description:

15. Unit #	*16.* Unit Name	*17.* Fuel	Rate (MMBTU/hour)	*18.* Construction Date
S5 (EI)	Indirect Heat Exchanger – (Electrode Boiler)	Natural Gas	12.5	December 31, 1972
S6 (EI)	Indirect Heat Exchanger	Natural Gas	12.5	December 31, 1972

2. Applicable Regulations:

401 KAR 59:015 New indirect heat exchangers (on or after April 9, 1972)
40 CFR 63 Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Industrial/Commercial/Institutional Boilers and Process Heaters

3. Compliance Requirements: While burning natural gas unit is considered in compliance with opacity standard and no testing, monitoring, or recordkeeping is required.

D. SUBJECT ITEM 4 REQUIREMENTS: Potlines (3)

1. Description:

19. Unit #	*20.* Unit Name	*21.* Control	*22.* Construction Date
E1 (P2, P3, P4, P5)	Potline 1	Dry scrubber/baghouse for reactors, pot hood (roof monitor) for potroom.	August 1972
E3 (P6, P7, P8, P9)	Potline 2		August 1972
E5 (1P, 2P, 3P, 4P)	Potline 3		August 1979

2. Applicable Regulations:

401 KAR 61:165 Existing primary aluminum reduction plants
40 CFR 63 Subpart LL Primary Aluminum Production NESHAP

3. Compliance Requirements:

a. Pursuant to 40 CFR 63.847:

i. The TF emissions from each potline shall be monitored through quarterly performance tests using the procedures outlined in 40 CFR 63 (63.847(d)(1)), TF emissions from potlines.

ii. For TF emissions for each potline, the permittee shall compute and record the monthly average from at least three runs for secondary emissions and the previous 12-month average of all runs for the primary control system to determine compliance with the applicable emission limit. OR

iii. The TF emissions can be measured from one potline and other similar potlines can be monitored by alternative procedures provided the permittee demonstrates that the potlines are similar.

b. While operating under an approved implementation plan, the owner or operator shall monitor the operating parameters of each control system, keep records, and submit periodic reports as required for each source subject to this subpart.

c. The permittee shall install, operate, and maintain a monitoring device to determine the daily weight of aluminum produced.

d. The permittee shall visually inspect the exhaust stacks of each control device on a daily basis for evidence of any visible emissions indicating abnormal operation.

e. If a monitoring device for a primary control device measures an operating parameter outside the limits established pursuant to 40 CFR 63.847 (h) or if visible emissions indicating abnormal operation are observed from the exhaust stack of a control device during daily inspections, the permittee shall initiate the corrective action procedures identified in the startup, shutdown, and malfunction plan within 1 hour. Failure to initiate the corrective action procedures within 1 hour or to take the necessary corrective actions to remedy the problem is a violation.

f. The permittee shall install, operate, and maintain ambient air monitoring equipment for fluorides at sites as specified by the Division if requested.

g. Sulfur Dioxide Emissions: Annual sulfur dioxide (SO2) emissions shall not exceed 5,262.3 total tons per year from the production of primary aluminum by electrolysis (potlines) and anode bake furnace operations.
Compliance Demonstration: Compliance with the annual SO2 emission limit shall be determined by computing the total primary aluminum production SO2 emissions monthly using the Alcan SO2 Calculation Engine and calculating a rolling 12-month SO2 emission total for the primary aluminum process (potlines and anode baking furnaces).

E. SUBJECT ITEM 5 REQUIREMENTS: Green Anode Production

1. Description:

23. Unit #	*24.* Unit Name	Rate (tons/year)	*25.* Construction Date
M2 (1E)	Anode Mix Conveying	127,020	December 12, 1972
M3 (2E)	Anode Mix Conveying	127,020	January 1, 1975
M4 (3E)	Anode Mix Conveying	127,020	June 19, 1979
M5 (6E, 7E, 8E)[2, 3]	Anode Mixers (3)	54,437	August 4, 1972
M6 (9E,EA)[2, 3]	Anode Mixers (2)	36,291	July 28, 1977
M7 (5E,4E)[2, 3]	Anode Mixers (2)	36,291	August 4, 1972

Emissions from Process units M2 thru M7 are controlled by a baghouse and dry coke scrubber (Unit # EN);

a.

[2] Units M5, M6, and M7 include a common pitch scale not listed as a separate unit

[3] Units M5, M6, and M7 prepare materials for two existing Presses Press 1 and Press 2

2. Applicable Regulations:

401 KAR 61:020 Existing Process Operations for Unit M2, M3, M5 and M7
401 KAR 59:010 New Process Operations for Unit M4 and M6
40 CFR 63 Subpart LL Primary Aluminum Production NESHAP

3. Compliance Requirements:

a. To provide reasonable assurance that the dry coke scrubber is operating correctly, the coke and air flow rates shall be monitored.

b. The permittee shall specify and provide the basis or rationale for selecting parameters to be monitored and the associated operating limits for the emission control device.

c. The permittee shall visually inspect the exhaust stacks of each control device on a daily basis for evidence of any visible emissions indicating abnormal operation.

d. If a monitoring device for a primary control device measures an operating parameter outside the limits established pursuant to 40 CFR 63.847 (h) or if visible emissions indicating abnormal operation are observed from the exhaust stack of a control device during daily inspections, the permittee shall initiate the corrective action procedures identified in the startup, shutdown, and malfunction plan within 1 hour.

e. Failure to initiate the corrective action procedures within 1 hour or to take the necessary corrective actions to remedy the problem is a violation.

f. To provide reasonable assurance that the particulate matter emission limitations are being met, the permittee shall monitor monthly the amounts and types of process weight added to the paste production process and follow the preventive maintenance plan.

g. To provide reasonable assurance that the visible emission limitations are being met the permittee shall:

i. Determine the opacity of emissions during operation from each stack or vent by Reference Method 9 annually, or more frequently if requested by the Division.

ii. Perform a qualitative visual observation of the opacity of emissions from each stack/vent on a monthly basis and maintain a log of the observation. The log shall note:

- Whether any air emissions (except for water vapor) were visible from the vent/stack.
- All emission points from which visible emissions occurred.
- Whether the visible emissions were normal for the process.

iii Determine the opacity of emissions by Reference Method 9 if qualitative visible emissions from any stack/vent are seen.

F. **SUBJECT ITEM 6 REQUIREMENTS: Anode Bake Furnaces**

1. **Description:**

N2 (EE) Anode Bake Furnaces (2)
Description: Processing rate 120,888 tons per year baked anodes.
Fuel Usage: 450 mm scf per year natural gas usage per furnace.
Control equipment: Baghouse/dry scrubber
Construction date: June 19, 1979

2. **Applicable Regulations:**
401 KAR 59:010 New Process Operations
40 CFR 63 Subpart LL Primary Aluminum Production NESHAP

3. **Compliance Requirements:**
To avoid PSD, annual sulfur dioxide (SO2) emissions shall not exceed 5,262.3 total tons per year from the production of primary aluminum by electrolysis (potlines) and anode bake furnace operations.
Compliance Demonstration: Compliance with the annual SO2 emission limit shall be determined by computing the total primary aluminum production SO2 emissions monthly using the Alcan SO2 Calculation Engine and calculating a rolling 12-month SO2 emission total for the primary aluminum process (potlines and anode baking

furnaces).

a. Pursuant to 40 CFR 63.847, the TF and POM emissions from each anode bake furnace shall be monitored through annual performance tests using the procedures outlined in 40 CFR 63 (63.847 and 63.849), TF and POM emissions from anode bake furnaces.

b. For each anode bake furnace, the permittee shall measure and record the emission rate of TF and POM exiting the outlet of the primary control system for each anode bake furnace and compute and record the annual average (minimum of three runs per year) for the primary control device. All valid runs must be included in the averages.

c. To provide reasonable assurance that the total fluoride emission limitations are being met, the permittee shall determine upper and/or lower operating limits, as appropriate for each monitoring device for the emission control system from the values recorded during each of the runs from the initial performance test and from historical data.

d. While operating under an approved implementation plan, the owner or operator shall monitor the operating parameters of each control system, keep records, and submit periodic reports as required for each source subject to this subpart.

e. The permittee shall install, operate, and maintain a monitoring device to determine the daily weight of green anode material introduced into the furnace.

f. The permittee shall visually inspect the exhaust stacks of each control device on a daily basis for evidence of any visible emissions indicating abnormal operation.

g. If a monitoring device for a primary control device measures an operating parameter outside the limits established pursuant to 40 CFR 63.847 (h) or if visible emissions indicating abnormal operation are observed from the exhaust stack of a control device during daily inspections, the permittee shall initiate the corrective action procedures identified in the startup, shutdown, and malfunction plan within 1 hour.

h. Failure to initiate the corrective action procedures within 1 hour or to take the necessary corrective actions to remedy the problem is a violation.

i. To provide reasonable assurance that the particulate matter emission limitations are being met, the permittee shall monitor monthly the amounts and types of process weight added to the anode bake furnaces (as green anodes) and follow the facility preventative maintenance (PM) plan (see attachment).

j. To provide reasonable assurance that the visible emission limitations are being met the permittee shall:

i. Determine the opacity of emissions during operation from each stack or vent by Reference Method 9 annually, or more frequently if requested by the Division.

ii. Perform a qualitative visual observation of the opacity of emissions from each stack/vent on a daily basis and maintain a log of the observation. The log shall note:

a. Whether any air emissions (except for water vapor) were visible from the vent/stack.

b. All emission points from which visible emissions occurred.

iii. Determine the opacity of emissions by Reference Method 9 if qualitative visible emissions from any stack/vent are seen.

G. SUBJECT ITEM 7 REQUIREMENTS: Holding & Re-Melt Furnaces

1. Description:

26. Unit #	*27.* Unit Name	Control	*28.* Construction Date
F1 (I1-I6)	Holding Furnaces (6) with In-Line Degassers	None	August 4, 1972
F2 (I7, I8)	Holding Furnaces (2) with In-Line Degassers	None	August 4, 1979

2. Applicable Regulations

401 KAR 59:010 New process operations for unit F2
401 KAR 61:020 Existing process operations for unit F1
40 CFR Part 63 Subpart RRR Secondary aluminum production NESHAP

3. Compliance Requirements:

a. The permittee shall perform monitoring pursuant to 40 CFR 63 Subpart RRR, section 63.1510, Monitoring and compliance provisions.

b. To provide reasonable assurance that the visible emission limitations are being met the permittee shall:

i. Determine the opacity of emissions during operation from each stack or vent by Reference Method 9 annually, or more frequently if requested by the Division.

ii. Perform a qualitative visual observation of the opacity of emissions from each stack/vent on a monthly basis and maintain a log of the observation. The log shall note:

c. Whether any air emissions (except for water vapor) were visible from the vent/stack.

d. All emission points from which visible emissions occurred.

e. Whether the visible emissions were normal for the process.

iii. Determine the opacity of emissions by Reference Method 9 if qualitative

visible emissions from any stack/vent are seen.

H. SUBJECT ITEM 8 REQUIREMENTS: Roads

1. Description:

EP (EP) Unpaved Roads
Control equipment: None
Construction date: 1972

2. Applicable Regulations
401 KAR 63:010 Fugitive emissions

3. Compliance Requirements: The permittee shall monitor the time, date, and type of precaution taken to prevent particulate matter from becoming airborne.

I. SUBJECT ITEM 9 REQUIREMENTS: Natural Gas Usage

1. 1. Description:

29. **Unit #**	***30.*** **Unit Name**	***31.*** **Rate**	**Units**	***32.*** **Construction Date**
A7 (90)	Re-Melt Furnace	64	MMBTU/hr	August 1, 1999
H1 (1I)	Homogenizing Furnace	13.5	MMBTU/hr	March 1990
H2 (2I)	Homogenizing Furnace	13.5	MMBTU/hr	March 1990
H3 (3I)	Homogenizing Furnace	13.5	MMBTU/hr	March 1990
H4 (I31)	Homogenizing Furnace	14.0	MMBTU/hr	December 29, 2000

2. Applicable Regulations: 401KAR 59:010: New process operations

3. Compliance Requirements: The permittee shall monitor source-wide throughput of fuel, and only natural gas shall be used as fuel for all furnaces.

CREDIBLE EVIDENCE:

This permit contains provisions which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has only adopted the provisions of 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12 into its air quality regulations.